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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Anuj Batra

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TEXAS INSTRUMENTS INCORPORATED

P O BOX 655474, M/S 3999

DALLAS, TX 75265

EXAMINER

MUI, GARY

ART UNIT

PAPER NUMBER

2416

NOTIFICATION DATE

DELIVERY MODE

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ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/688,169	Applicant(s) BATRA ET AL.	
	Examiner GARY MUI	Art Unit 2416	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 April 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 6-35 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6-35 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1 – 4 and 6 – 35 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 101

2. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. Claims 1 – 4, 6 – 11, and 23 – 26 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 1 – 4, 6 – 11, and 23 – 26 are directed to a data structure per se. The claims recite the physical layer which does not fall within any of the statutory classes.

Claims 12 – 14 and 27 – 35 are directed to a data structure per se. The claims recite the physical layer which does not fall within any of the statutory classes.

Claim(s) 15 – 26 is/are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. While the claims recite a series of steps or acts to be performed, a statutory “process” under 35 U.S.C. 101 must (1) be tied to particular machine, or (2) transform underlying subject matter (such as an article or material) to a different state or thing. See page 10 of In Re Bilski 88 USPQ2d 1385. The instant claims are neither positively tied to a particular machine that accomplishes the claimed method steps nor transform underlying subject matter, and therefore do not qualify as a statutory process. The

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modulation scheme is broad enough that the claim could be completely performed mentally, verbally or without a machine nor is any transformation apparent.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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7. Claims 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lakkis (US 7,031,371 B1) in view of Joo (US 2004/0208253 A1).

For claim 12, Lakkis teaches time domain data generated by an inverse fast Fourier transform (IFFT) of frequency domain data (see column 10 lines 54 - 59; time-frequency transformation). Lakkis fails to teach one of a cyclic prefix and a cyclic postfix; and a guard interval between the time domain data and said one of a cyclic prefix and a cyclic postfix comprising a plurality of zero samples. Joo from the same field of endeavor teaches the guard interval insertion is achieved by transmitting null data in corresponding positions and a cyclic prefix and cyclic postprefix (see paragraph 0010). Therefore, it would have been obvious to one skilled in the art to have a prefix and/or postfix and a guard interval as taught by Joo into Lakkis. The motivation for doing this is to provide a reliable system by overcoming inter-symbol interference.

For claim 13, Joo teaches a guard interval immediately following each OFDM symbol, and wherein the guard interval has a time period sufficient to allow the UWB transmitter to switch from one channel to another (see paragraph 0010).

For claim 27, it is inherent of the system the frequency domain data to be generated in the frequency domain.

For claim 28, Lakkis and Joo fails to explicitly teach the frequency domain data is generated from time domain data by a discrete Fourier transform (DFT). However, Lakkis does teach the use of FFT to generate time data from frequency data (see column 12 line 54 - 65) and it would have been a matter of design choice to use DFT over FFT.

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For claim 29, Lakkis and Joo fails to explicitly teach the bandwidth of the OFDM signals is at least 500 MHz. However, it is a matter of design choice to use at least 500 MHz as the bandwidth because it is inconsequential as a whole as it may be presumed that any value might yield an acceptable result. Therefore, to use the bandwidth in at least 500 MHz is an obvious to one of ordinary skill in the art at the time of the invention by the applicant.

For claim 30, Lakkis and Joo fails to explicitly the IFFT produces the time domain data form 128 contiguous tones. However, it is a matter of design choice to use any number of tones to produce the time domain data because it is inconsequential as a whole as it may be presumed that any value might yield an acceptable result. Therefore, produce the number of tones is an obvious to one of ordinary skill in the art at the time of the invention by the applicant.

Claim Rejections - 35 USC § 103

8. Claims 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lakkis and Joo as applied to claim 12 above, and further in view of Foerster (US 2004/0047285 A1; hereinafter “Foerster”).

Fro claim 14, Lakkis and Joo teaches all of the claimed invention with the exception of a UWB receiver configured to receive TFI-OFDM signals, wherein the UWB transmitter and the UWB receiver together form a personal area network (PAN). Foerster form the same field of endeavor teaches a UWB receiver configured to receive TFI-OFDM signals, wherein the UWB transmitter and the UWB receiver together form a personal area network (PAN) (see paragraph 0017 and 0018, the SB-UWB receiver and SB-UWB transmitter combined to form the SB-UWB system). Therefore, it would have been obvious to one skilled in the art at the

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time of the invention to use the transmitter and receiver as taught by Foerster into Lakkis and Joo. The motivation for doing this is to provide an efficient system by protecting the waveforms.

Claim Rejections - 35 USC § 103

9. Claims 31 – 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lakkis and Joo as applied to claim 12 above, and further in view of Halford et al. (US 2004/0032825 A1; hereinafter “Halford”).

For claim 31, Lakkis and Joo teaches all of the claimed subject matter with the exception of the frequency domain data comprises encoded information bits and pad bits. Halford from the same field of endeavor teaches that the packet payload includes packet user information or user data. The packet tail includes packet ending signaling, such as pad bits, flush bits, SIFs extensions, etc. (see paragraph 0005). Therefore, it would have been obvious to one skilled in the art to have information and pad bits in a packet as taught by Halford into Lakkis and Joo. The motivation for doing this is to increase the efficiency of the system by minimizing the signal processing.

For claim 32, Lakkis, Joo, and Halford fails to explicitly teach the information bits and pad bits are encoded using a $R=1/3$, $K=7$ convolution code. However, it is a matter of design choice to use any convolution code because it is inconsequential as a whole as it may be presumed that any value might yield an acceptable result. Therefore, to use the convolution code is an obvious to one of ordinary skill in the art at the time of the invention by the applicant.

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For claim 33, Lakkis, Joo, and Halford fails to explicitly teach the encoded information bits and pad bits are punctured to generate various coding rates from $R=11/32$ to $3/4$. However, it would have been a matter of design choice to code rates of any value because it is inconsequential as a whole as it may be presumed that any value might yield an acceptable result. Therefore, to use the code rate is an obvious to one of ordinary skill in the art at the time of the invention by the applicant

Claim Rejections - 35 USC § 103

10. Claims 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lakkis, Joo, and Halford as applied to claim 32 above, and further in view of Li (US 2002/0119781 A1; hereinafter “Li”).

For claim 34, Lakkis, Joo, and Halford fail to explicitly teach the encoded bits are interleaved, mapped onto symbols, and then onto tones. Li from the same field of endeavor teaches the use of OFDM through TDMA where the data is placed into clusters (see paragraphs 0003 and 0023 and figure 2). Therefore, it would have been obvious to one skilled in the art at the time of the invention to interleave and map the bits as taught by Li into Lakkis, Joo, and Halford. The motivation for doing this is to provide an efficient system by mitigating the effects of intercell interference.

For claim 35, Li teaches tones include pilot tones that are randomized according to a cover sequence (see paragraph 0052). Therefore, it would have been obvious to one skilled in the art at the pilot tones as taught by Li into Lakkis, Joo, and Halford. The motivation for doing this is to provide an efficient system by mitigating the effects of intercell interference.

Claim Rejections - 35 USC § 103

11. Claims 15, 16, 18 – 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Foerster in view of Joo.

For claim 15, Foerster teaches providing a UWB physical layer operational to generate OFDM symbols within a desired band and interleaving the OFDM symbols across both time and frequency to divide the desired band into smaller sub-bands (see paragraphs 0013 and 0014). Foerster et al. fails to teach inserting a guard interval comprising plural zero samples after each OFDM symbol, such that the UWB physical layer has sufficient time to switch from its current channel to the next channel. Joo from the same field of endeavor teaches the guard interval insertion is achieved by transmitting null data in corresponding positions and a cyclic prefix and cyclic postfix (see paragraph 0010). Therefore, it would have been obvious to one skilled in the art to have a prefix and/or postfix and a guard interval as taught by Joo into Foerster. The motivation for doing this is to provide a reliably system by overcoming inter-symbol interference.

For claim 16, it is inherent of Foerster SB-UWB communication system that the desired band comprises the 3.1 – 10.6 GHz UWB band because this is the band that is regulated for UWB systems.

For claim 18, Foerster teaches the UWB physical layer is further operational to generate a single OFDM signal solely from a contiguous subset of tones (see paragraph 0014).

For claim 19, Foerster teaches the UWB physical layer is further operational to employ different subset of tones between consecutive OFDM symbols (see paragraph 0014).

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For claim 20, Forester teaches the UWB physical layer is further operational to vary the subset of tones as a function of the time such that the UWB physical layer achieves the same transmit power as a full-band signal that occupies the complete bandwidth spanned by an inverse Fast Fourier Transform (see paragraph 0015).

For claim 21, Forester teaches the UWB physical layer is further operational to generate a signal having a bandwidth greater than 500 MHz in response to 122 tones (see paragraph 0013, generating impulses having a 500 MHz bandwidth).

For claim 22, Forester teaches the UWB physical layer is further operational to generate a single OFDM symbol solely from a contiguous subset of tones, wherein each subset contains 128 consecutive tones (see paragraph 0014).

Claim Rejections - 35 USC § 103

12. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Forester and Joo as applied to claim 15 above, and further in view of Tewfik et al (US 2004/0005016 A1; hereinafter “Tewfik”)

For claim 17, Forester and Joo teaches all of the claimed subject matter with the exception of the physical layer is further operational to support a wireless PAN having data payload communication capabilities of 55, 80, 110, 160, 200, 320, and 480 Mb/s. Tewfik from the same field of endeavor teaches a high bit rate ultra-wideband the nodes exchange data at bit rates higher than 0.8 Gb/s with short latencies and the system is capable of achieving high bitrate rates on the order of 2 Gb/s (see paragraph 0017 and 0075). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to use

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the payload capabilities as taught by Tewfik in Forester. SB-UWB communication system.

The motivation for doing this is that it will give end users more rate options.

Conclusion

13. **Examiner's Note:** Examiner has cited particular paragraphs or columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

In the case of amending the claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gary Mui whose telephone number is (571) 270-1420. The examiner can normally be reached on Mon. - Thurs. 9 - 3 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on (571) 272-3139. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

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/Ricky Ngo/
Supervisory Patent Examiner, Art Unit
2416

/Gary Mui/
Examiner, Art Unit 2416
06/19/2009